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of such a fundamental group. In the two chapters assigned to Pteridophytes, only the Lycopodiales and Filicales are discussed. In the two chapters dealing with Bryophytes, students of this group will be surprised to learn that in Hepaticae the sporophyte, "except in the peculiar group Anthocerotae, does not carry on photosynthesis." A statement concerning the ventilated structures of the gametophyte of Bryophytes is likely to mislead any but intimate students of the group: "In the sporophyte of vascular plants the typical photosynthetic organ is the leaf blade with its ventilated mesophyll and stomatal control. In the gametophyte of mosses and liverworts a similarly ventilated structure is seen in the leaves of the larger mosses and in the thallus-structure of the Marchantiales. These are, however, parts of the gametophyte, and the ventilated structure is here produced mainly by involution of the outer surface, while in vascular plants it arises from intercellular splitting of the cell walls. The physiological end is the same, in both cases, but the place and means are different. Plainly these are the results of parallel evolution, or homoplasy." Had the actual facts in Marchantiales been stated, the proof of homoplasy would have been absolute. Thallophytes are dealt with in 8 chapters. In the introductory chapter a statement widely applicable to all plant phyla is made: "It must not be assumed that all the organisms grouped under a common designation are necessarily akin to one another. . . . Lines of descent are *divergent*, and the thallophytes would appear to represent a brush of phyletic lines radiating outwards from some simpler source." The chapter on sex and heredity is presented so clearly, so free from all verbiage, that beginners can easily grasp this subject, usually considered so complex. Likewise, the chapter on alternation of generations, the land habit, and the rise and fall of the gametophyte, is a masterpiece of lucid expression.

This text is the work of a man notable for brilliant research and also for exceptional power as a teacher. It is an example of the results obtained by a long period of first-hand contact with material as well as the presentation of these results to many generations of students.—W. J. G. LAND.

Forest products

As the utilization of plant products is a matter of interest to all botanists, a book discussing the use of wood and forest products, other than lumber, should find a place in all botanical libraries. The present volume⁴ is attractive in appearance, well illustrated, and carefully organized. Some idea of its scope may be obtained from such chapter headings as the following: Wood pulp and paper, Tanning materials, Veneers, Slack and tight cooperage, Naval stores, Wood distillation, Charcoal, Boxes, Cross ties, Poles and piling, Mine timber, Fuel, Shingles, Maple syrup and sugar, Rubber, Dye woods, Excelsior and cork. Under each topic the character and source of the raw material,

⁴ BROWN, N. C., *Forest products*. 8vo. pp. xix+471. *figs.* 120. New York: Wiley & Sons. 1919. \$3.75.

the tree species involved, the processes of manufacture, the marketing, the utilization, and values are discussed. Whenever any attempts have been made toward standard specifications and grading of the products, these are given in considerable detail. Statistics of production in the United States or of importation from other lands are arranged in convenient tables, and still more important for the scientist is the bibliography which is appended to each chapter. Costs of raw material, labor, overhead, and marketing are considered, as well as selling prices and total value of production; while a detailed index makes this mass of information available for ready reference.—GEO. D. FULLER.

Economic woods

RECORD's⁵ presentation of the subject of wood structure has already made his book, in its first edition, indispensable in all laboratories where the identification of wood is attempted, on the basis of its structure as revealed through the microscope. The volume has also proved equally useful in classes where the general principles of wood structure are being studied, hence an enlarged second edition will be welcomed by a considerable constituency.

Among the desirable features of the work are good clear illustrations (whose number might be increased to advantage), logical organization, concise statement, convenient tables for reference, and a well arranged, excellent bibliography, which in the present edition is brought down to 1918. The identification key has been revised and improved and appears adequate to the demands likely to be made upon it.

One of the features of the new edition is an appendix devoted to a general description of the woods of the United States and their classification on a structural basis. Tables giving the occurrence of such structures as pits, spiral markings, and tyloses in various genera and species afford convenient means of classification and of easy reference.—GEO. D. FULLER.

NOTES FOR STUDENTS

Influence of a crop on succeeding one.—HARTWELL and his associates⁶ have done some very important work on the influence of crop plants on those which follow. Some crops are very injurious to those which follow them, while other successions reveal no injurious action. As is shown by an illustration on the front cover of Bulletin 175, buckwheat is greatly injured when it follows millet, but shows good development when it follows turnips. The method,

⁵ RECORD, S. J., *Identification of the economic woods of the United States*. 8vo. pp. 157. *pls. 6. figs. 15*. New York: Wiley & Sons. 1919. \$1.75.

⁶ HARTWELL, B. L., and DAMON, S. C., *The influence of crop plants on those which follow*. Bull. 175. Agric. Exp. Sta. R.I. State College. 1918.

HARTWELL, B. L., PEMBER, F. R., and MERKLE, G. E., *The influence of crop plants on those which follow*. Bull. 176. Agric. Exp. Sta. R.I. State College. 1919.